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The Florida Entomologist

Official Organ of the Florida Entomological Society

TABLE OF CONTENTS, VOLUME XXVIII, 1945-46

Berner, Lewis, New Species of Florida Mayflies (Ephemeroptera) 60-82

Editors, Bayard Franklin Floyd (Obituary) 39

Editors, U. C. Loftin Dies 48-49

Editors, Joseph R. Watson (Obituary) 57-59

Errata for Vol. XXVII, No. 4 54-55

Johannsen, O. A., Two New Species of Cecidomyiidae from Florida 8-10

Kelsheimer, E. G., Notes on the Great Elm Leaf Beetle 25-27

Madden, A. H., A Brief History of Medical Entomology in Florida 1-7

Needham, James G., Some Dragonflies of Early Spring in South Florida 42-47

Querci, Orazio and Lycaena Romei, Effects of the Reflected Solar Radiation on Insects 20-21; 36-38

Proceedings of the Annual Meeting of the Florida Entomological Society 14-18

Watson, J. R., The Damage of *Melipotis acontioides* to the Royal Poinciana 18-19

Watson, J. R., A New Host for *Composia fidelissima vagrans* Bates 29

Watson, J. R., Whiteflies on Gardenias 30-31

Watson, J. R., The Ecological and Geographic Distribution of the Thysanoptera of the Geenton 33-36

Watson, J. R., Some August Skippers of the Great Smoky Mountain National Park and Vicinity 50-53

Watson, J. R., Distributional Notes on Two Species of Thysanoptera 53-54

Wisecup, C. B., and W. D. Shillinger, Observations on the Abatement of Pest Mosquitoes with DDT Residual Sprays 27-29

Wolfenbarger, D. O., Cuban Laurel Thrips Control on *Ficus benjamini* 82-83

Wright, Mike, Dragonflies Predaceous on the Stablefly *Stomoxys calcitrans* (L.) 11-13; 31-32

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The
Florida Entomologist

Official Organ of the Florida Entomological Society

VOL. XXVIII AUGUST, 1945 No. 1

A BRIEF HISTORY OF MEDICAL ENTOMOLOGY IN FLORIDA [1]

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Bureau of Entomology and Plant Quarantine

The present war has focused attention upon the importance of medical entomology as never before during the history of man. Under these circumstances it appears that a brief review of the history of medical entomology in Florida should be of interest and value to members of this Society.

Florida probably has suffered as severely from the ravages of insect-borne diseases as any part of the United States. This is due primarily to the subtropical climate extending over the greater part of the State, which favors the propagation and development of large numbers of disease-carrying and pestiferous insects. A classic reference to the abundance of some of these forms of insect life was made by the first Federal entomologist, Townsend Glover, in his "Florida Litany":

> From red bugs and bed bugs, from sand flies and land flies,
> Mosquitoes, gallinippers and fleas,
> From hog ticks and dog ticks and hen lice and men lice,
> We pray thee, good Lord, give use ease.
> All the congregation shall scratch and say Amen.

A secondary factor is the proximity of the State to the West Indies, Mexico, Central and South America, which facilitates the introduction of insect-transmitted diseases from these countries.

Obviously, it is impossible on this occasion to present a complete account of the subject, which would involve a discussion of extensive work performed in the State on the various phases

[1] Presidential address presented at the annual meeting of the Florida Entomological Society, November 24, 1944. Most of the information used in the preparation of this paper was obtained from the 1900-1942 annual reports of the Florida State Board of Health.

of medical entomology proper, including the control of pest insects and the allied field of veterinary entomology. Instead, I will mention only the more important insect-borne diseases of man that have occurred in the State, and sketch the efforts and progress that have been made in their control.

The most important of these diseases undoubtedly is malaria. Malaria has caused more ill health and loss of life in Florida than all other insect-borne diseases combined. It was the chief cause of sickness and death among the Spanish expeditions and early colonies. Furthermore, until comparatively recent times malaria was one of the chief factors retarding the development of the State. Even during the last 40 years the total number of cases annually has often been as high as 41,000 to 94,000 and the number of deaths from 205 to 470.

Although several malarial vectors occur in the State, only one *Anopheles quadrimaculatus* Say, is important in the transmission of the disease (King, et al. 4). For this reason malaria has never been prevalent in those sections of the State where this species cannot breed.

The story of the real campaign against malaria in Florida extends back only a little over 20 years. In the interim following the discovery of its transmission by mosquitoes, only superficial programs designed mainly for the education of the public were carried out. The first substantial malaria-control project was conducted between 1920 and 1921 at Perry, where 65 per cent of the population were afflicted with the disease. It is believed that this was the first time in the history of the United States when all the then known means of malaria control were utilized, including oiling, screening, stocking ponds with surface minnows, administration of quinine, and extensive drainage. The campaign was successful not only against malaria but also against dengue, as will be mentioned later.

In 1930 the Division of Malaria Research was established at Tallahassee by the Rockefeller Foundation under the direction of Dr. Mark F. Boyd, and in 1931 the Division of Malaria Control was organized in the State by the United States Public Health Service under the direction of Dr. T. H. D. Griffiths. The same year Dr. W. V. King, of the Bureau of Entomology and Plant Quarantine, who had just been stationed at Orlando after returning from foreign service, agreed to act as consultant in entomology to the State Board of Health. Thus the services of three of the leading malariologists in the country were secured

by the State. It should be noted that a portion of Dr. Boyd's work has been the successful use of the malarial mosquito in the treatment of paresis. Thus some measure of compensation has been obtained for all the losses suffered by the people of the State from this disease.

Beginning in 1934 large-scale malaria-control projects were undertaken by the Civil Works Administration. This work was continued under the Works Progress Administration until the termination of that organization. An extensive demonstration program of malaria control was conducted in Escambia County from 1938 to 1940 as a cooperative project of the county, the United States Public Health Service, and the Rockefeller Foundation under the direction of Dr. J. E. Elmendorf, Jr.

In 1941 the Bureau of Malaria Control, supported jointly by the United States Public Health Service, the Florida State Board of Health, and the Rockefeller Foundation, was incorporated within the State Board of Health organization. That Bureau is concerned with the making of surveys, formulation, promotion and supervision of control projects, and the training of personnel. Since 1941 work at military bases in the State has been given priority.

It is evident that considerable effort has been expended in the control of malaria in Florida. However, although the results have been encouraging, progress has been slow. Even as late as 1939 the death rate from malaria was third highest in the United States, being 17.3 per 100,000 population as compared with 2.6 for the entire country. During the last few years malaria incidence has reached an all-time low over the entire Southeast, but it appears that natural causes may be partially responsible.

Before leaving the subject of malaria, I should like to mention an interesting and important discovery which resulted from the early attempts to combat the disease at a time when even the causal organism was unknown. Early in the nineteenth century at Apalachicola, Dr. John Gorrie invented the first ice-making machine, in the course of his attempts to develop a cure for malaria (Fairlie *3*). The purpose of this device was to cool the rooms of patients suffering from the disease. Thus indirectly the struggle against malaria in Florida led to the development of artificial refrigeration with all its attendant benefits.

Yellow fever undoubtedly has caused more panic and disruption of business, and probably more sickness and loss of

life, than any other disease during the relatively brief periods it has been prevalent in the State. Its common vector, *Aedes aegypti* (L.), occurs over the entire State ready to spread the disease whenever given an opportunity. However, climatic conditions as a rule do not permit breeding throughout the year, and this has prevented the disease from becoming endemic.

Yellow fever was introduced into Cuba from Central America in 1750 (Peabody *5*). From there it spread to Florida. One of the first records of the disease in the State is that of a severe epidemic at Pensacola in 1822. The disease continued to reappear in that city at intervals during the next 60 years, the most severe outbreak occurring in 1882 with 2,200 cases and 252 deaths.

An epidemic struck the thriving Gulf coast community of St. Josephs (now Port St. Joe) in 1848 and is said to have destroyed 75 per cent of the population (Dau *2*). This was one of the chief factors which led to the complete abandonment of the town shortly thereafter.

The town of Fernandina suffered severely from the disease in 1877, and 1,000 cases and 94 deaths occurred. The appearance of the disease caused the usual panic, and for several weeks all business was at a standstill.

By far the most widespread and devastating epidemic occurred in 1887-88 (Chapin *1*, Rerick *6*). In May 1887 yellow fever appeared in Key West, having been brought by ship from Havana. From Key West it spread to Tampa, becoming epidemic by fall and spreading to Manatee and Plant City. Following a mild winter, it sprang up again in the spring, appearing in Jacksonville by August and spreading from there to Macclenny, Sanderson, Fernandina, Gainesville, Enterprise, Live Oak, and Green Cove Springs. There were several thousand cases, and over 500 persons lost their lives, including many prominent people of the State.

One of the methods tried against the disease during the early stages of the epidemic in Jacksonville will serve to illustrate the pitiful ignorance with respect to insect-borne diseases existing at that time. This method was based on the theory that explosion of gunpowder at night would destroy the germs of the disease by concussion of the atmosphere. A battery of six cannons was used, but after five nights the ammunition was exhausted and before more could be obtained the artillery men had fled the city and the test had to be terminated. It is re-

ported (Rerick *6*) that nothing was proved by the experiment except that the patients could not endure the noise.

The seriousness and magnitude of the epidemic of 1887-88 was responsible for the establishment of the Florida State Board of Health, whose chief function was to prevent a recurrence of this terrible scourge. This function was conducted so thoroughly that between 1883 and 1905 three threatened epidemics of the disease were averted. Since that time the Board has maintained constant vigilance to prevent reintroduction of the disease. It has also taken the lead in the prevention and control of all other insect-borne diseases and has broadened its functions to the point where it represents one of the most effective and valuable organizations in the State. Thus yellow fever inadvertently made a great contribution to the welfare and development of Florida.

Dengue, also transmitted by *Aedes aegypti,* is not a spectacular disease but has caused considerable sickness and suffering in the State. Fortunately, the mortality from this disease has been comparatively low. Records of its occurrence are relatively recent, apparently because it was formerly confused with yellow fever, malaria, or even typhoid. In 1905 there was a heavy outbreak at Key West, Tampa, Miami, and Jacksonville, and a total of about 11,700 cases was reported. In 1907 it was reported from Hillsborough County, but also was known to have been epidemic at Key West. The 1921 outbreak along the lower East Coast stimulated such public interest in mosquito control that a campaign was initiated at Miami in 1922. In 1922 there was heavy recurrence of the disease in 47 counties, with a total of 82,681 cases and 69 deaths reported. A striking example of the value of mosquito-control work was furnished by the fact that Miami and Perry remained free of the disease. It will be recalled that the malaria-control project at Perry was completed in 1921. An epidemic at Miami in 1934 was responsible for a State-wide clean-up of the breeding places of domestic mosquitoes. Owing to closer attention to mosquito control, there have been fewer cases of the disease in recent years.

Diseases carried by houseflies (*Musca domestica* L.) also have caused much sickness and death in the State. Early in the present century the newly established urban centers in keeping with the times were equipped with very primitive sanitary systems. Under these conditions houseflies were given every

opportunity to spread such diseases as dysentery, typhoid, and tuberculosis.

In 1899 there were 200 deaths from typhoid and 197 from dysentery, and in 1900 typhoid was considered one of the most dangerous diseases in the State. As late as 1913 inattention to the screening of kitchens and dining rooms was said to have resulted in a heavy toll of sickness and death from typhoid, and in 1914 the State health officer reported that flies were mainly responsible for the disease and recommended the screening of all privies. In 1915 an outbreak of dysentery at Lakeland, costing the city about $20,000 and causing 8 per cent mortality, was traced directly to transmission by houseflies. The records are not so definite with respect to tuberculosis, but it is highly probable that a great deal of the dissemination of this disease during the same period may be attributed to houseflies. Since 1916 there has been a rather sharp decline in the incidence of all these diseases except tuberculosis, and although other factors are involved, the improvement of housefly control undoubtedly has played a large part in bringing this about.

Flea-borne diseases have been absent from Florida until comparatively recent times. Bubonic plague appeared at Pensacola in June 1920 and there were 10 cases and 6 deaths, but the disease was promptly eradicated.

Endemic typhus appeared in Florida about 12 years ago. This disease, first discovered by Dr. Nathan Brill among immigrants at New York City in 1898, disappeared for over 20 years, and then spotted outbreaks began to appear in the South. In 1932 four deaths from typhus were recorded in Florida, and since that time the incidence has risen steadily. In 1937, 107 cases were reported, and in 1943 almost three times as many, or 314 cases, occurred. The disease is being combated by extensive rat-control projects, and possibly the peak has been reached.

Reference should be made to the recent work at the Orlando laboratory of the Bureau of Entomology and Plant Quarantine on the prevention of insect-borne diseases. This laboratory was established in 1930 for research on mosquitoes, and in 1942 was reorganized for the purpose of discovering more effective methods of protecting the armed forces from attack by these diseases. For security reasons details of the work cannot be given at this time, but it has been instrumental in reducing sickness and loss of life among our own troops and those of

our allies. Thus, research conducted in Florida has not only been of considerable importance in the war effort, but has also provided new and more powerful weapons for future use against disease-carrying insects in the State.

In conclusion, it should be stated that, although considerable progress has been made in the field of medical entomology in Florida during the past 40 years, much remains to accomplished. Several endemic insect-borne diseases are still of medical importance. Furthermore, the danger of introducing additional diseases of this nature or their insect vectors from other endemic areas, such as Africa and the Orient, has been greatly increased by the development of more rapid means of transportation. To offset these factors, however, recent research has provided more effective means of combating the insects involved.

Florida entomologists share the responsibility with the medical profession for the continued progress of the struggle against insect-borne diseases in the State. Our primary obligation is to provide continuous improvements in insect-control measures. Even those of us not actively engaged in the field of medical entomology may be of assistance in various ways. Probably the chief manner in which we can help is by acquainting our fellow citizens with the important bearing that the control of insects of medical importance has upon the future health and development of the State.

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TWO NEW SPECIES OF CECIDOMYIIDAE FROM FLORIDA

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Lestodiplosis floridana n. sp.

MALE. Antenna a third longer than the insect, 2 + 12 segments, first and second approximated; the stems of the flagellar segments subequal in length, their diameters gradually decreasing toward the apex, the third being one and two-thirds, the fourteenth four times as long as the corresponding width. The necks of the segments, on the other hand, increase in length and decrease in width toward the apex, the third measuring 0.05 by 0.02 mm., the thirteenth measuring 0.07 by 0.01. Dimensions of the intermediate segments may be determined by interpolation. The basal node of each flagellar segment has one, the distal node two, whorls of long circumfili with regular loops. The node of the terminal segment is about a half longer than the stem. The first palpal segment is nearly quadrate, the second 2.5 times as long as broad, the third nearly as long, the fourth slightly longer than the second. Head, thorax, and abdomen pale brownish, the mesonotum somewhat darker. Legs yellow, coxae and fifth tarsal segments, and tips of second, third, and fourth tarsal segments dusky, the darker coloring at the tips of the intermediate tarsal segments owing to the presence of dark hairs. In rubbed specimens the legs are wholly yellow. Claws simple, strongly curved, not angulate, as long as the empodia. Wings hyaline with three dark spots in front of posterior radial branch, one basal, one median, and one on apical fourth; a spot at tip of this branch; three spots between radius and cubitus opposite those in front; an alongate forked spot covering petiole and branches of cubitus, and an irregular spot covering the wing base, all rather illy defined. The spots may be wholly or in part lacking in rubbed specimens because they owe their origin to the sparsely distributed hairs on the wing surface. Anterior branch of the radius ends about opposite the cubital fork; its posterior branch ends very slightly behind the wing tip. Halteres yellowish. Basistyle of terminalia fully as long as the third tarsal segment of fore legs, with a well developed, somewhat angulate, basal lobe; dististyle glabrous, slender, curved, about half as long as basistyle. Dorsal plate (so-called) emarginate, lobes rounded; ventral plate with rounded apex.

Length 1.8 mm. (alcoholic specimens) ; wing length 1.7 mm., width 0.9 mm.

The species resembles both *L. ridipennis* Johnson and *L. florida* Felt, but differs in size, in leg and wing markings, and in relative antennal length.

The pinkish larvae occur, presumably as predators, in the flower heads of *Bidens pilosa* L. Reared January, 1944, at Englewood, Florida, by Dr. J. G. Needham.

Holotype and paratypes in the Cornell University Collection.

***Asphondylia bidens* n. sp.**

MALE. Antennae brown; 2 + 12 segments, the two basal short, third (first flagellar) four times as long as broad, its length 1/6 mm., fourteenth (twelfth flagellar) four times as long as broad, its length 1/8 mm., total antennal length 1.9 mm.; intermediate segments in slightly decreasing lengths. Circumfili with low loops as figured for *A. monacha* by Felt (31st Rept. N. Y. State Ent. 1915, p. 115, fig. 11a). Palpi three-segmented, first basal short, second three times the first, third five times the first in length. Head, including face, yellow to yellowish-brown, mesonotum dark brown; submedian, longitudinal lines yellow, very slender; scutellum brownish yellow; metanotum yellow; humeri narrowly, over and in front of wing base, and upper margin of the pleura, yellow; pectus brown. Abdomen brownish yellow, incisures narrowly, pleural conjunctivae more broadly yellow. Terminalia brown. Legs including coxae, yellow; tarsi darker apically; claws simple, strongly curved; empodium about as long as the claws. Wings hyaline, sparsely hairy, radial veins yellow; costa ends at the apex of the wing, anterior branch of the radius ends about opposite the cubital fork. Halteres whitish, stem pale yellow. Terminalia prominent, slightly wider than long; terminal clasp robust, but little longer than wide, each with a pair of stout, triangular, pointed, blackish teeth that are about as wide at the base as the length; aedeagus Y-shaped, the up-curved, caudad projecting stem longer than the arms; dorsal plate deeply cleft, lobes broad with rounded apices.

Length (alcoholic specimens) 2 mm.; wing length 2 mm., width two-fifths of length.

FEMALE. Antennae with 2 + 12 segments; total antennal length 1.6 mm.; third segment 5.8 times as long as the diameter, fourth to tenth in gradually decreasing lengths, the tenth about

¾ as long as the fourth, the terminal segments (tenth to fourteenth) measure 0.12 - 0.10 - 0.075 - 0.056 - 0.035 mm.; fourteenth slightly wider than long. Palpi 3-segmented, first a little longer than broad, second nearly three times, third about four times as long as the first. Coloring similar to that of the male but somewhat darker, the thorax and abdomen brown; legs pale brown, basal part of the femora yellow, tarsi darker brown especially apically. Immature specimens somewhat paler. Ovipositor with very slender, aciculate terminal segment the base of which, when retracted, reaching forward to the second abdominal segment.

Length 2.35 mm. (alcoholic specimens); wing 2.50 by 1.08 mm.

EXUVIAE. Light brown; anterior horns short, stout, conical, pointed, and contiguous at base. Mesonotum, scutellum and first tergite without spinules; remaining tergites with transverse rows of spinules; the second to seventh with a regular, closely set row on the distal third and with a transverse belt on the proximal third which on the more anterior segments is composed of two irregular rows of sparsely set spinules, becoming more sparse on the posterior segments. The eighth segment has a dozen or more spinules on the disc and near the posterior margin a closely set row of stouter ones.

Length 2.8 mm., width near middle 0.9 mm. Pupa a third shorter than the exuviae.

This species differs from *A. florida* Felt in being smaller, and in the paler coloring and the smaller length-width ratio of the third antennual segment of the male.

Reared January, 1944, at Englewood, Florida, by Dr. J. G. Needham. The larvae make top-shaped galls in the corollas of some of the marginal flowers of *Bidens pilosa* L.

Holotype, allotype, and paratypes in the Cornell University Collection.

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DRAGONFLIES PREDACEOUS ON THE STABLEFLY *Stomoxys calcitrans* (L.)

MIKE WRIGHT

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Agricultural Research Administration
Bureau of Entomology and Plant Quarantine

There are considerable data in the literature, both from field observations and actual analyses of stomach contents, on dragonflies as predators on mosquitoes, houseflies, and gnats, but the only reference known to us that lists dragonflies as predators of *Stomoxys calcitrans* is by Dove and Simmons (1942). These writers state " . . . when the adult fly populations were reduced to a low point, three species of dragonflies, *Anax junius* (Drury), *Pachydiplax longipennis* (Burm.), and *Tramea lacerata* (Hagen), appeared to be effective in obtaining a further reduction of the pests. The dragonflies were most abundant during October, and about sunset they were observed to capture dog flies."

In regard to outbreaks of the stablefly, or dog fly, along the Florida Gulf beaches, Simmons and Dove (1941) state that under favorable conditions the insect may occur in large numbers from the middle of August to the middle of October in the littoral extending from the Alabama-Florida boundary line eastward 400 miles to Cedar Keys, Fla. In this area the heaviest concentration of the flies occurs within a section 200 miles long between Pensacola and Carrabelle.

Large swarms of dragonflies were observed along the beaches at Fort Walton, Apalachicola, and Carrabelle, Fla., in 1941. These swarms were composed mostly of *Anax junius* with some individuals of *Tramea* and *Pachydiplax longipennis*. At Panama City, Fla., during the period from September 30 to October 2, 1942, large swarms of *Anax junius* were again encountered and, as during 1941, the dragonflies were observed to capture and eat large numbers of dog flies. It was noted, especially during the 1941 season, that these swarms of dragonflies were not constantly present along the beaches but appeared at irregular intervals. The significance of these sporadic appearances was not appreciated until the 1943 season, during which time daily observations were possible on the dragonfly populations from Panama City west to Navarre, Fla.

The following is a list of dragonfly species, with their relative abundance, noted in this area during August, September, and October of 1943.

Abundant: *Anax junius* (Drury), *Tramea carolina* (Linnaeus), and *Pantala flavescens* (Fabricius).

Common: *Erythemis simplicicollis* (Say) and *Pachydiplax longipennis* (Burmeister).

Occasionally common: *Coryphaeschna ingens* (Rambur).

Occasional: *Argia fumipennis* (Burmeister) and *Ischnura ramburii* (Selys).

Rare: *Celithemis amanda* (Hagen), *Libellula vibrans* Fabricius, *L. auripennis* Burmeister, *L. pulchella* Drury, and *Enallagma durum* (Hagen).

As can be seen from the above list, three species, *Anax junius, Pantala flavescens,* and *Tramea carolina,* were found in large numbers, and our observations showed these to form almost 100 percent of the swarms noted along the beaches. The other species of Anisoptera found in this area did, undoubtedly, eat dog flies, but their relatively small numbers made them ineffective in control as well as inconspicuous.

The presence of adult dog flies along the beaches in appreciable numbers always follows a northerly (offshore) breeze which blows them out of the wooded interior, where they had previously sought refuge after being dispersed from their beach breeding areas by south winds. During the 1943 season the first appreciable population of dog flies along the beaches appeared during the afternoon of August 15, and lasted until August 21, at which time the wind changed to a southerly breeze and drove the flies inland. During the period of high fly populations considerable swarms of *Anax junius, Tramea carolina,* and *Pantala flavescens* were noted daily. They patrolled the beaches and adjoining highway continuously in search of dog flies. On August 21 the wind changed and blew the flies inland so that by late afternoon few if any of the pests could be found along the beaches. It was noted that the swarms of odonates were still present on the beaches at dusk on this date, and were catching what few dog flies could be found. When the area was visited early on the morning of August 22 only a few dragonflies (the normal population) were seen. This disappearance within so short a time after the change of wind together with our previous knowledge of the sporadic appearances of the

dragonfly swarms led us to believe that there might be a definite correlation between the appearances of high populations of dog flies and dragonflies.

During the early part of the morning of September 8 the wind, which had been from the south for several weeks, suddenly shifted to the north. By noon a sufficient number of dog flies had appeared to cause annoyance to animals on the beaches, and they continued to increase during the remainder of the day. Dragonflies were relatively rare until just before dusk, when large swarms suddenly appeared. At about 3:00 P.M. on September 13 the wind changed and began blowing from the south, and by dusk almost all the dog flies had disappeared. The dragonflies remained in large numbers throughout the day but had disappeared by the next morning.

It would appear from these observations that the presence of swarms of dragonflies along the beaches during period of high dog fly populations was due to one or a combination of the following two factors: (1) A congregation of the odonates due to wind action, or (2) a definite migration of the insects to a point of high concentration of food. It should be pointed out (1) that the three species of dragonflies concerned are very strong flies, (2) that the swarms apparently break up as they leave the beaches, because no such congregations of dragonflies have been regularly observed inland, and (3) that although there are northerly winds before and after the dog fly season, the dragonfly swarms appear only when numbers of dog flies are present. It is of interest to note that when the dog flies are moved inland they are scattered over a wide area, but when the northerly winds appear they are congregated in a relatively small area, hence the appearance of high populations. From these observations, therefore, it seems logical to conclude that the swarming of dragonflies along the beaches is a definite migration for the purpose of obtaining food.

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PROCEEDINGS OF THE ANNUAL MEETING OF THE FLORIDA ENTOMOLOGICAL SOCIETY

Winter Park, Florida, November 24-25, 1944

The beautiful campus of Rollins College was the scene of the 1944 annual meeting of the Society, which was held in conjunction with the annual meeting of the Florida Academy of Sciences. President A. H. Madden presided at the first session which was held in Annie Russell Theatre on Friday afternoon. A most interesting and inspiring feature of this session was Mr. Madden's presidential address. He chose as his subject, A Brief History of Medical Entomology in Florida. Following this address, members of the staff of the Orlando Laboratory of the Bureau of Entomology and Plant Quarantine presented a symposium on new methods developed for controlling insects of medical importance affecting the armed forces. The topics discussed and the workers presenting them were: (a) Investigations on the Control of Lice Attacking Man, by Laurence C. McAllister, Jr.; (b) DDT in Residual Sprays, in Aerosols, and in Concentrated Spray for the Control of Houseflies, Mosquitoes, and Bedbugs, by Arthur Lindquist; (c) DDT as a Mosquito Larvicide by Christian C. Deonier; and (d) Insect Repellents by Fred A. Morton. On Saturday morning the remaining papers were given. A paper entitled, DDT as a Vegetable Insecticide, prepared by Lt. Jack C. Russell, was read. Professor J. R. Watson presented two papers: Some Lepidoptera of the Great

Smoky Mountains National Park as compared with Florida Forms; and *Melipotis acontioides* as a Pest of Royal Poinciana, Dr. H. T. Fernald gave an informal talk on ants, bringing to the attention of his audience the growing importance in Florida of the little fire ant *Wassmannia auropunctata* (Roger). On Friday evening, members of the Society, their wives, and friends, joined the members of the Florida Academy of Sciences at their annual dinner, and with them enjoyed good food, good fellowship, and a good address by the retiring President of the Academy, Dr. L. Y. Dyenforth. Twenty members and about thirty visitors attended the sessions of the Society. The Society was particularly honored by the presence of three distinguished members of the National Health Administration, Chungking, China, in addition to visitors from a number of other states in this country.

BUSINESS MEETING

The business session of the Society convened at ten o'clock Saturday morning, November 25, 1944.

REPORT OF THE SECRETARY

The report of the Secretary was read and approved as read.

REPORT OF THE TREASURER-BUSINESS MANAGER

For the Period December 1, 1943 to November 1, 1944

Receipts:

Balance on Hand, December 1, 1943	$136.28
From Dues of Members	68.50
From Subscriptions to the Florida Entomologist	50.50
From Advertising in the Florida Entomologist	75.00
From Sale of Back Numbers of the Florida Entomologist	122.01
From Members for Reprints, Cuts, etc.	24.30
Total	$476.59

Expenditures:

Printing Three Issues of the Florida Entomologist	$174.47
Postage, Stationery, and Other Supplies	22.88
Flowers (for Funerals)	12.00
Exchange on Checks and Money Orders at Bank	3.25
Total	$212.60
Balance on Hand, November 1, 1944	$263.99

Respectfully submitted,

C. B. WISECUP, Treasurer-Business Manager

On motion the report of the Treasurer-Business Manager was accepted, subject to approval of the Auditing Committee.

REPORT OF THE AUDITING COMMITTEE

I have examined the books of the Treasurer-Business Manager and report that I found the accounts accurate and in order.

Respectfully submitted,
R. L. MILLER

On motion the report of the Auditing Committee was accepted.

REPORT OF THE MEMBERSHIP COMMITTEE

The Membership Committee recommends that the following associate members be raised to the rank of active membership: J. M. Crevasse, Jr., Lt. R. G. Dahms, Lt. James E. Gillaspy, Lt. E. S. Herald, H. S. McClanahan, and Paul T. Riherd. The committee further recommends that the following persons be elected to associate membership: W. G. Bruce, Douglass Burnett, Jr., Sgt. Nathan B. Carson, Lt. Geo. A. Edwards, Miss Margaret Greenwald, A. W. Morrill, Jr., Fred Morton, Howard B. Reitmeyer, Wesley Foster Taylor, and Lt. D. C. Thurman, Jr.

Respectfully submitted,
C. B. WISECUP, Chairman
A. H. MADDEN
R. L. MILLER

On motion the report was accepted and the persons named were declared elected to membership as indicated.

REPORT OF THE RESOLUTIONS COMMITTE

Professor J. R. Watson, Chairman, presented the report of the Resolutions Committee. On motion the report was approved.

OLD BUSINESS

T. H. Hubbell, acting as a committee of one to investigate the desirability of affiliation of the Florida Entomological Society with the Florida Academy of Sciences, reported that the Academy has no provisions for accepting affiliate societies. He recommended that the Society take no action toward affiliation, but simply continue to hold its annual meetings in conjunction with those of the Academy when such seems desirable.

On motion this recommendation was approved.

NEW BUSINESS

There was no new business to come to the attention of the Society.

REPORT OF THE NOMINATING COMMITTEE

The committee nominates the following members to fill the designated offices and positions for the year 1945:

President—A. C. Brown
Vice-President—Norman C. Hayslip
Secretary—A. N. Tissot
Editor of the Florida Entomologist—J. R. Watson
Associate Editor—G. B. Merrill
Members of the Executive Committee—A. H. Madden (for 1 year); T. H. Hubbell (for 2 years).

Respectfully submitted,
H. S. McCLANAHAN, Chairman
C. C. DEONIER
E. G. KELSHEIMER

There were no further nominations from the floor and on motion the report of the Nominating Committee was accepted and the Secretary was instructed to cast an unanimous ballot for the election of the persons named.

Following the transaction of the above business, the meeting adjourned.

Respectfully submitted,
A. N. TISSOT, Secretary

REPORT OF THE RESOLUTIONS COMMITTEE

I

WHEREAS, the Florida Entomological Society lost two of its oldest and most distinguished members when it pleased Almighty God to call from our midst on February 23, 1944, Peter Henry Rolfs, and, on August 23, 1944, Edward William Berger, whose long and distinguished careers as public servants won for them fame in this country and abroad for their achievements in research and investigation, to the end that agriculturists might produce profitable crops in spite of the menace of plant pests and diseases, and

WHEREAS, in the death of these two beloved members, who did so much for our Society, we have suffered an irreparable loss,

NOW, THEREFORE, BE IT RESOLVED, that we the members of the Florida Entomological Society in meeting assembled in Winter Park, Florida, this 25th day of November, 1944, make this record in testimony of our appreciation of Doctors Rolfs and Berger with full realization of the loss we have sustained, and

BE IT FURTHER RESOLVED, that the Secretary of the Society be and hereby is instructed to inscribe this resolution in the Society's minute book and to send a copy to the daughters of Doctor Rolfs, Miss Clarissa Rolfs and Mrs. Robert Hargrave, and to Mrs. Emily Berger and daughter, Mrs. Helen Berger (Dale) Hume.

II

WHEREAS, the 1944 annual meeting of the Florida Entomological Society has been one of pleasure and profit through the united efforts and cooperation of various individuals and organizations,

NOW, THEREFORE, BE IT RESOLVED, that the thanks of the Society be extended to:

The President and faculty of Rollins College for making available to us a suitable meeting place and other facilities and for assisting in many ways;

The officers and members of the Florida Academy of Sciences for their kindness and cooperation in our joint meeting;

The speakers who contributed to our program;

The officers and members of committees for their services during the past year.

THE DAMAGE OF MELIPOTIS ACONTIOIDES TO THE ROYAL POINCIANA

J. R. WATSON

(Continued from last issue)

One might surmise that this is due to temperature; that the same temperature which causes the buds to burst also hatches the eggs. But when we come to consider the leaf case bearer of pecans the explanation will not hold. It so happens that different varieties of pecans will vary as much as a month in the time of leafing. Nevertheless, the caterpillars will come out of their hibernacula on any variety when the buds

begin to break and not before.* Here then we may have two varieties of pecans in the same orchard on certainly similar soils and exposed to the same degree of heat and moisture; yet the caterpillars on the late leafing varieties may be a month behind those varieties that leaf early. The conclusion must seem inescapable, in this case, that the bursting buds give off something that stimulates the emergence of the worms from the hibernacula. Perhaps some similar explanation applies to the Poinciana caterpillars. Leastwise, it is very interesting that when a defoliated tree puts out leaves at an abnormal time, in January, the caterpillars also appear at the abnormal time.

How many generations will we see in a year is a question that we cannot answer readily. April 3rd of this year, Mr. Singleton reported small worms on the Poincianas but they seemed to disappear and not a worm was noticed on these trees until October 16th, when they re-appeared. There must undoubtedly have been several generations of caterpillars between those dates but their numbers were probably so small that Mr. Singleton did not notice them.

This insect seems to be about a widely spread in Florida as the Royal Poincianas; i.e., from St. Petersburg to Key West. Holland in his Moth Book records the insect under the name *Melipotis sinualis* Harvey, as occurring from Texas and Arizona, south. He does not mention Florida as in its range, nor say anything about its food plant. However, in Grosbeck's list of Lepidoptera of Florida, it is recorded from Miami, without giving its host plant.

In a letter dated August 22, 1945, Dr. Philip J. Westgate of the Sub-Tropical Experiment Station at Homestead, makes a further contribution to our knowledge of this insect. "In the past week our big Poinciana tree in our front yard has been practically defoliated by thousands of these caterpillars. In the morning there is a steady migration from the leaves down the trunk. During the day the trunk is covered with thousands of the caterpillars. I have killed thousands of them with a 5% DDT dust.

---

* Data supplied by A. M. Phillips of the laboratory for the study of pecan insects at Monticello, Fla.

EFFECTS OF THE REFLECTED SOLAR RADIATION ON INSECTS

ORAZIO QUERCI and LYCAENA ROMEI

The caterpillars of many species of Lepidoptera exposed to the light near a white wall become excited, and if the surface is metallic, collapse in a short time even if the temperature of the air is moderate (1).

Larvae of *Pieridae,* shut within a box of white paper and exposed to the sun on barren soil, collapse in a short time, but if the box is set in the sun above dense masses of living vegetation most larvae, and chiefly the big ones, are not injured (2).

When the sky is cloudless after a storm the soil dries rapidly in places where the rainfall has been scanty. In such situations we have seen, in several countries, some caterpillars of different species crawling along the paths and on the stems of the bushes, though generally they remained hidden. Returning a few hours later, we perceived some rotten larvae dangling from the stems and others almost carbonized in their living position. This sudden mortality occurred, from our observations, at a moderate temperature. At Lisbon (Portugal), on April 24, 1933, a strong wave of heat arose while the maximum temperature reached only 23.8° (74.8° F.), but the emanation of radiant energy from the ground and buildings was so burning that about a thousand larvae of different species of *Pieridae,* that we were rearing at home, collapsed in a short time (3). After similar heat-waves, the Lepidoptera in the country always became very scarce. We suppose that the larvae were killed by the combined action of the ionized air and the radiations springing from the soil joining those coming from the sun.

At Philadelphia, Pa., we reared many larvae of *Pieridae* from May to October, 1932. While the streets around our home remained moist from the showers these caterpillars grew and pupated rapidly, even within a week after hatching, when the temperature was about 32° (89.6° F.). However, as soon as the soil of the city became barren from lack of rain, the larvae in our rooms died at 25° (77.0° F.). In summer rarely the soil remained damp for the seven days that those larvae need to mature, and therefore the mortality in our breeding cages was very high (4).

We tried to prevent the death of some larvae by putting a batch of them, during the hottest periods of each day, within

a half-shut icebox, and another batch into a well shut icebox, but with little ice, in order to keep the temperature moderately low. Invariably, the larvae in the open in our rooms died within a short time, and those in the half-open icebox, where the temperature was about 15° (59° F.), ceased to be active and died in a few days. Only the caterpillars in the other ice-box, into which the burning air of the outside did not penetrate, remained alive (5).

At Salonika (Greece), in 1935, those larvae of *Pieridae*, which at Philadelphia, during the heat waves, collapsed even in a room at 15° (59° F.), fed actively and pupated within an incubator at 40°-44° (104°-111.2° F.) both in a dry or very wet room. Other larvae of the same species, which remained without care for ten days in an electric thermostat at 38° (100.4° F.), matured there, formed chrysalides and produced butterflies, in spite of the dry heat and lack of light and air, eating up the roots of the dry plants which were in the box (6). During the above recorded trials the sky was cloudy and the ground was always moist from the frequent rains, so that the feeble solar radiations were absorbed by the humidity of the soil, and the larvae developed well as the high temperature compensated for the low radiation.

Eggs and larvae, kept at Philadelphia in a refrigerator at 0° (32° F.), which was opened from time to time to place in or to take out some specimens, died there after some days, both in May and June, during which time it often rained and the soil remained generally wet. On the contrary in July, when the soil was barren, and the strong radiant energy in the air occasionally came into contact with those organisms, though for a short time only and at a low temperature, it supported their vitality for about a month. Also in July, some eggs in an ice house, where the temperature varied from 7° (44.6° F.) to 10° (50° F.), hatched there after two weeks (7). On the other hand, at Lisbon, while the weather was generally cloudy and raining, eggs and larvae of the same species died after some days in a room at 10° (8). In this latter case, the feeble radiations were not sufficient to balance the depressing effects of the rather low temperature.

From what we have recorded it seems that radiations reflected from the ground are an important factor of the climate.

(To be continued)

The Florida Entomologist

Official Organ of the Florida Entomological Society

VOL. XXVII CONTENTS AND INDEX

TABLE OF CONTENTS, VOLUME XXVII, 1945

Editors, Dr. Peter Henry Rolfs (Obituary) 1

May Beetles of Georgia (Review) 34

Dr. E. W. Berger (Obituary) 41-43

Lieu, K. O. Victoria, The Study of Wood Borers in China 61-100

Smith, Clyde F., *Drepanaphis tissoti*, A New Species of Aphid from Florida 55-57

Smith, Marion R., Additional Ants Recorded from Florida with Description of Two New Species 14-17

Taylor, Doyle J., Life History Studies of the Sugarcane Moth Borer 10-13

Tissot, A. N., and J. O. Pepper, Two New Aphids from Rhododendron and Related Plants 21-33

Tissot, A. N., Additions to the Lachnini of Florida 43-54

————, *Cinara osborniana* nom. n., A Correction 102

Watson, J. R., A New Cuban Pest of Citrus ..... 13 and 18

————, The Mourning Cloak Butterfly in Florida 17

————, *Herse cingulatus* Fab. as an armyworm 58

————, The Damage of *Melipotis acontioides* to the Royal Poinciana ..... 58-59, and 103

Wright, Mike, Notes on Dragonflies in the Vicinity of New Smyrna Beach, Florida 35-39

Wylie, W. D., Crambus haytiellus (Zincken) as a Pest of Carpet Grass 5-9

INDEX OF VOLUME XXVII, 1944

Abutilon theophrasti Medic., 99
Aedes sollicitans (Walker), 35, 36, 38
  taeniorhynchus (Wied.), 35, 38
Aleurodes nubifera Berger, 42
Amphorophora, 21
  azaleae Mason, 28
  kalmiaflora n. sp., 27, 28
  mitchelli Mason, 28
  rhododendronia Mason, 28, 32
  rhokalaza n. sp., 22, 28, 32
Anax junius (Drury), 35, 38, 39
Anomalagrion hastatum (Say), 36
Ants, 14
Aphа enogaster (Attomyrma) floridana M. R. Smith, 14
  (Attomyrma) texana macrospina M. R. Smith, 14
Aphis saligna Gmelin, 48
Aschersonia, 42
Azalea canescens Mich., 27
  nudiflora L., 27
  viscosa L., 27
Azalea, Wild, 26

Berger, Dr. E. W., obituary, 41

Cannacria gravida (Calvert), 35
Cardicondyla venustula Wheeler, 15
Celithemis eponina (Drury), 35
  ornata (Rambur), 35
Chelidonium sp., 63, 74
Chreonoma dioica, Fairmaire, 63
Cinara carolina Tissot, 44
  juniperivora (Wilson), 44
  longispinosa Tissot, 44
  osborni n. sp., 45
  osborniana nom. n., 102
  saligna (Gmelin), 48
  tujafilina (Del Guercio), 52
  wacasassae n. sp., 49
  watsoni Tissot, 54
Coryphaeschna ingens (Rambur), 35, 36, 38
Crambus haytiellus (Zincken), 5
  profanellus Walker, 5
Cryptocephalus marginicollis Suffr., 13
Culicoides furens (Poey), 38

Dialeurodes citri (Ashm.), 42
  citrifolii (Morgan), 42
Diatrea saccharalis Linn., 10
Dormyrmex pyramicus flavopectus n. subsp., 15
Dragonflies, 35
Drepanaphis nigricans Smith, 55
  sabrinae Miller, 55
  tissoti Smith, 55

Enallagma civile (Hagen), 35, 36
Erythemis simplicicollis (Say), 35
Erythrodiplax berenice (Drury), 35
  connada minuscula (Rambur), 35
Essigella pini Wilson, 43
Eulachnus rileyi (Williams), 43
Euponera (Trachymesopus) gilva (Roger), 14

Formica pallidefulva archboldi n. subsp., 16

Herse Cingulatus Fab., 58

Ischnura posita (Hagen), 36
  ramburii Selys, 35, 36

Kalmia latifolia L., 27, 28

Lachnini, 43
Lachnus, 48
Laurel, mountain, 26
Libellula auripennis Burm., 35
  vibrans Fab.
"Limneria" pattoni Ashm., 9
Longistigma caryae (Harris), 54

May beetles, 34
Melanauster chinensis Forster, 62
Melipotis acontioides Guen., 58, 103
Monomorium sp., 70, 83
Mourning Cloak Butterfly, 17

Nadezhdiella cantori Hope, 63, 74
Nehalennia integricollis Calvert, 35, 36

Pachydiplax longipennis (Burm.), 35, 38
Pantala flavescens (Fab.), 38, 39
Paradoxecia pieli Lieu, 62, 69, 84
Pheidole dentigula M. R. Smith, 14
Proceratium croceum (Roger), 14
Psacothea hilaris Pascoe, 62, 69, 84
Psorophora columbiae (D. & K.), 38
Pterochlorus, 48

Rhododendron, 21
Rhododendron maximum L., 26
Rolfs, Dr. Peter Henry, obituary, 2

Solenopsis pergandei Forel, 15
Stomoxys calcitrans (Linn.), 39
Strumigenys (Cephaloxys) dietrichi M. R. Smith, 15
Sugarcane moth borer, 10

Tramea carolina (Linn.), 35, 36, 38
Tuberolachnus, 48

Unilachnus parvus (Wilson), 54

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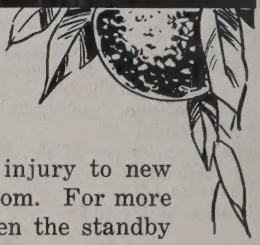

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